# ICD2 - HLS Central West ICD10 Bot



# Overview

ICD-10 is the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD), a medical classification list by the World Health Organization (WHO). It contains codes for diseases, signs and symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or diseases.

ICD2 is a simple, yet friendly bot that assists care providers with the lookup of ICD10 codes. This bot can be deployed and configured for several channels, including [Facebook Messenger](https://www.facebook.com/messenger), [Microsoft Teams](https://products.office.com/en-US/microsoft-teams/group-chat-software), [Slack](https://slack.com/), and other clients.

# Components

## ICD2DB

This is a [Microsoft SQL Server](https://azure.microsoft.com/en-us/services/sql-database/) database with a single table (ICD10Codes). Each row in the table contains an ICD10 code, and its associated text description. A [full-text index](https://docs.microsoft.com/en-us/sql/relational-databases/search/full-text-search?view=sql-server-2017) on the table allows for ICD10 codes to be looked up using natural text search.

## ICD2-BOT

A bot built using the [Microsoft Bot Framework](https://dev.botframework.com/), [NodeJS](https://nodejs.org/en/), and [TypeScript](https://www.typescriptlang.org/) that handles user input for searching ICD10 codes.

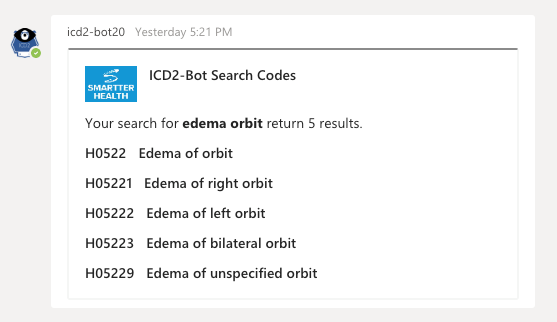


Figure 1: ICD2-Bot in Action

# Deployment

## Tools Needed

* An [Azure](https://azure.microsoft.com/en-us/) Subscription that will host the ICD2 components.
* [Azure Module](https://docs.microsoft.com/en-us/powershell/azure/overview?view=azps-2.2.0) for PowerShell.
* [SQL Server Management Studio](https://docs.microsoft.com/en-us/sql/ssms/download-sql-server-management-studio-ssms?view=sql-server-2017) for deploying the ICDDB database to Azure.
* (Optional) [Visual Studio Code](https://code.visualstudio.com/) for local development.
* (Optional) [NGrok](https://ngrok.com/) for local development and debugging.

## Step 1: Deploy the ICD2DB Database to Azure

ICD10 codes are stored in a SQL Server database. You must install and configure the database before using ICD2.

### Installation

While you can use the database scripts located in the *db* folder to create the database manually, the **easiest** way to get the database up and running is to perform the following:

1. Download *ICD2DB.bacpac* to your local machine from [here](https://github.com/SmartterHealth/icd2-bot/blob/master/db/ICD2DB.bacpac).
2. Upload the *ICD2DB.bacpac* file to [Azure Blob Storage](https://docs.microsoft.com/en-us/azure/machine-learning/team-data-science-process/move-data-to-azure-blob-using-azure-storage-explorer).
3. Import the *ICD2DB.bacpac* blob into [Azure SQL Server](https://docs.microsoft.com/en-us/azure/sql-database/sql-database-import#import-from-a-bacpac-file-using-azure-portal).
4. **Recommended:** Using [SQL Server Management Studio](https://docs.microsoft.com/en-us/sql/ssms/download-sql-server-management-studio-ssms?view=sql-server-2017), create a [SQL Login](https://docs.microsoft.com/en-us/sql/relational-databases/security/authentication-access/create-a-login?view=sql-server-2017) and add to the *dbdatareader* role for the database. Use this login when connecting to the database from the ICD2 bot. **Do not** use the admin password.

You will need your database name, login, and password for the next steps.

### Did it Work?

You can test the installation of the database by executing the following stored procedure from [[SQL Server Management Studio](https://docs.microsoft.com/en-us/sql/ssms/download-sql-server-management-studio-ssms?view=sql-server-2017):

EXEC    [dbo].[SEARCH\_CODES] @keywords = N'edema orbit'

If you get errors running the stored procedure, check the following:

* Ensure that the **SEARCH\_CODES** stored procedure has been created.
* Ensure the current user has execute permissions to the **SEARCH\_CODES** stored procedure. The user only needs *read* permissions for the **ICD10Codes** table.
* Ensure that the **ICD10Codes** table has a *FULL TEXT INDEX* on all columns.

## Step 2: Deploy the ICD2 Bot to Azure

ICD2 is implemented as a NodeJS application running in [Azure App Service](https://azure.microsoft.com/en-us/services/app-service/). You must install ICD2 to App Service to run and use it.

### Create the Azure Web App Bot

First, Create a web app bot in Azure using the instructions located [here](https://docs.microsoft.com/en-us/azure/bot-service/bot-service-quickstart?view=azure-bot-service-4.0).

* Select a good bot name that is meaningful to you.
* Make sure you specify a location near you.
* Under **Bot Template**, ensure that **SDK Version** is set to *SDK v.4* and **SDK Language** is set to *Node JS*. Choose *Echo Bot*, as we will deploy over this in later steps.
* Remember the name of the bot you specified, as well as the resource group you selected. You will need them later during deployment.

Clone or [download the \*.zip](https://github.com/SmartterHealth/icd2-bot/blob/master/deployment/icd2-bot.zip) for the bot source code. If choosing the \*.zip download, extract the contents to a working directory.

Next, navigate to the working directory, and run the following command after logging into Azure PowerShell.

az bot publish --name "your-bot-name" --resource-group "your-resource-group" --code-dir <path to directory>

We'll need to install dependencies. From the [Azure App Service Editor console](https://social.technet.microsoft.com/wiki/contents/articles/36467.understanding-the-azure-app-service-editor.aspx), run the following command:

npm install --production

This command will take several minutes to run, and you will see several warnings during it's execution. Ignore them unless the command fails completely.

Configure the settings in the web app bot application settings by adding the following values:

* DB\_UID=*nameofuser*
* DB\_PWD=*passwordofuser*
* DB\_SERVER=*yourserver*.database.windows.net
* DB\_NAME=*ICD2DB*

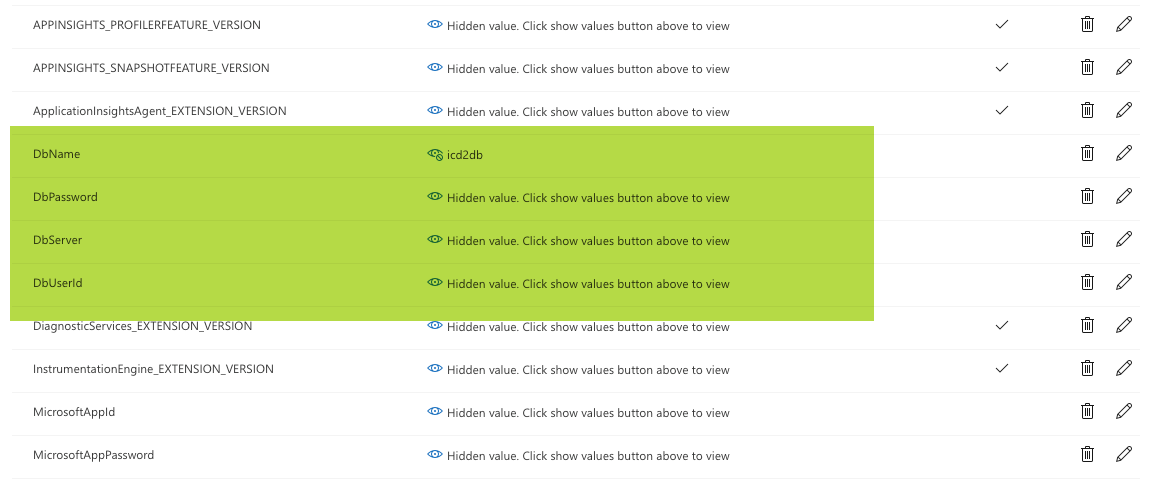


Figure 2: Configuring the ICD2 App Service instance in the Azure Portal.

# Troublshooting

[TBD]